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The American STATISTICIAN

A publication of the
AMERICAN STATISTICAL ASSOCIATION

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STATISTICAL POSITIONS IN THE FEDERAL SERVICE

During the past quarter century such marked changes have taken place in the aims, ideas, and methods of statistics, and statistical methods have pushed their way into so many new fields, that a complete overhauling of the classification of "statisticians" (i.e., of "statistical" positions) in the Government service is urgently needed. The U. S. Civil Service Commission has recognized this and is now actively engaged in formulating a set of new definitions of statistical positions. Last fall they distributed a tentative proposal, for comment. A second proposal was circulated in February of this year. This time the suggestions and recommendations of the various Government agencies and other groups concerned were considerably better coordinated. The Commission is now studying these suggestions and recommendations, and, recognizing the importance of the advice of experts in mathematical and applied statistics, formed a committee to advise it further on this matter. The committee, consisting of members of the ASA and IMS, represents a wide range of interests and Government agencies. A few of the pertinent problems which arose during the discussions of professional statistical positions follow.

Among the first questions which arise are how many and what types of statistical positions are to be recognized explicitly. The statistical positions in the Federal Government appear to fall into three main categories: (1) The easiest of these to define is the "mathematical statistician". The mathematical statistician is engaged primarily in the application of mathematical theory to the development of statistical methods (including designs for experiments and surveys) and to the determination of whether or to what extent various statistical methods are appropriate to the problems at hand. (2) A second type of statistical specialist, the "survey statistician", has arisen with the development of large-scale surveys. His primary duties are the planning, organization, and supervision of the process of collecting, summarizing, and presenting data, with the responsibility for finding ways to collect quantitative information that will be useful in the solution of important economic, social, or administrative problems. The survey statistician must be aware of the types of information available and the forms in which they are maintained, and he must recognize what data it is feasible to collect within the limits of his resources. (3) Another group of professional statisticians are the "analytical statisticians". Many of these positions are concerned with the preparation of statistical analyses and interpretations of data, as well as estimates and forecasts, in a particular subject field. Others make statistical analyses and interpretations of data in order to maximize the efficiency and usefulness of their agencies' operations. This class includes also those who "analyze and interpret" by selecting pertinent and useful items for inclusion in abstracts of statistical data for the use of others.

The third category, the "analytical statistician", brings up one of the key problems, namely: When is one who analyzes and interprets data a statistician, and when a subject-matter specialist? A given individual *might* qualify as either insofar as knowledge of a subject-field and knowledge and competence with statistical methods are concerned. However, the category to which his position is assigned is to be determined by the primary responsibilities of the position.

CONTINUED ON PAGE 13

NEWS

Committee on Human Resources created—Navy sponsors scientific roster—ASA adopts new constitution—Statistical summer sessions — New publications—June meetings

Committee on Human Resources established within the Research and Development Board

The Committee on Human Resources has recently been established within the Research and Development Board of the National Military Establishment. The Chairman is Dr. Donald G. Marquis, Chairman of the Department of Psychology, University of Michigan, and President of the American Psychological Association.

The Committee has been organized to evaluate the human resources of the Nation for the fields of research and development as an integral part of the National Defense program. Its mission is to merge into a joint effort programs related to the supply and utilization of scientific, technical and specialized personnel, and to the conduct of research on broad problems of human resources. The committee expects to work closely with the Armed Services and the National Security Resources Board in mobilization planning.

Some of the main subjects of interest to the committee are: sensory and psychomotor functions; human factors in the design of equipment; environmental conditions influencing efficiency; systems research; personality, test theory, learning, and training; selection, classification and management of personnel; enumerative techniques, sampling methods, population and migration studies, occupational mobility, and occupational trends; human relations and social organization, including group structure and dynamics, leadership, morale, public opinion and propaganda, mass behavior, and cultures.

Interdepartmental Science Committee to coordinate government research

The Federal government is today the principal patron of scientific research. In order to prevent overlapping and promote interchange of information, President Truman has established the Interdepartmental Committee on Scientific Research and Development to coordinate the scientific research which is carried on in government agencies.

Public Opinion Laboratory

The state of Washington has set up the Washington Public Opinion Laboratory, a non-profit scientific institute with the announced purpose of "serving the people of the state toward making democracy more effective".

Created in 1947 from grants by the state legislature, the laboratory is staffed and controlled by the social science departments of the state university in Seattle and the state college in Pullman. Its headquarters are on the university campus. Dr. Stuart C. Dodd and Dr. T. H. Kennedy are co-directors.

Laboratory activities will include civic research —"to find the facts and amplify the voice of the people on current issues and problems"; basic research—"to learn how to predict and guide social behavior"; technical research—"to improve methods of polling"; and training researchers—"to advance science and train scientists in social research".

The staff will include 70 part-time interviewers in 24 centers, and fellowships for graduate students are available.

Navy sponsors a scientific roster

The Office of Naval Research, under contract with the National Research Council, is sponsoring the establishment of a scientific roster of highly specialized natural and physical scientists. Initially, the roster is expected to include some 40,000 names with provision for expansion if necessary. The roster will be available for government use and is designed to meet the need expressed for a directory showing location and specialized fields of the Nation's top scientific personnel. It will also be used in studies concerning the utilization of scientists.

The project is geared into the circularization for the 8th Edition of *American Men of Science,* with a single questionnaire serving both purposes. The membership list of the American Statistical Association is among those being circularized. After information included in *American Men of Science* is abstracted, the schedules will be forwarded to the National Research Council. Final plans for the establishment and maintenance of the roster will take into consideration the proposed National Science Foundation bill now pending in Congress.

Budget Bureau inquires into construction volume statistics

The Bureau of the Budget has undertaken an inquiry into construction volume statistics in response to the widespread demand for improved information on this subject, and in an effort to resolve the existing differences of opinion as to appropriate sources for these data. The investigation is intended to ascertain what uses are made of statistics on construction volume, what data on this subject are needed and what degree of accuracy is required. It will also consider the appropriate organization of the Federal Government's collection and compilation of these statistics.

The inquiry will cover statistics on the volume of construction of all types. Particular emphasis will be placed on data on building construction, with specific reference to the relative merits of contracts and permits as sources of data.

Samuel J. Dennis, Chief of the Construction Economics Unit in the Office of Domestic Commerce, is on loan to the Budget Bureau for four months to direct the study. The Bureau staff will also be assisted in the inquiry by an Advisory Committee, composed of government and nongovernment representatives, which will review and appraise the plans for the investigation, the findings of fact and the proposed recommendations.

Consumers' price indexes issued by foreign governments

The Staff on Foreign Labor Conditions of the Bureau of Labor Statistics is preparing a detailed analysis of consumers' price indexes issued by foreign governments. At the present time analyses for the following countries are available in mimeographed form: Canada, Colombia, Czechoslovakia, Denmark, France, and Mexico.

Similar analyses are in the final stages for Finland, Norway, Palestine, Sweden, Switzerland, and the United Kingdom.

Materials have recently been gathered for the indexes prepared in São Paulo and Rio de Janeiro in Brazil, and in Caracas, Venezuela.

Mathematical statisticians meet in Germany

The first meeting of mathematical statisticians ever held in Germany took place on September 3–4, 1947, in Gottingen according to a report in *Nature*, Nov. 22, 1947. It was attended by British statisticians who had been invited in an endeavor to overcome the difficulties which German mathematicians have experienced by having been cut off from foreign literature for a long time. To facilitate the exchange of ideas it was decided to start work on an English-German dictionary of statistical terms and to supplement it with proposals for a universal notation.

Dorothy S. Brady receives Women's National Press Club award

Dorothy S. Brady, economist at the Bureau of Labor Statistics, received one of the eight awards for outstanding work during 1947, presented by the Women's National Press Club on April 3. The award was given for Dr. Brady's two year survey, "City Worker's Family Budget", recently published by the Department of Labor. Dr. Brady was assigned to the Bureau of Labor Statistics to apply her knowledge of mathematics to the techniques used in cost of living statistics during the critical war years.

New Constitution and higher dues approved

The draft of the new Constitution of the American Statistical Association was submitted to the general membership for final action by mail ballot in February, 1948. The final tally of this vote was 1,080 for adoption and 21 opposed. Accordingly, the Board of Directors ruled that the new Constitution will become effective January 1, 1949.

At the same time, the membership was polled by mail on the desirability of increasing dues from $5 to $8 per annum. This decision was approved by a vote of 1,148 to 761. The dues increase therefore became retroactively effective as of January 1, 1948.

Lasker Award to U. S. Committee on Joint Causes of Death

One of the Lasker Awards for 1947 was given to the United States Committee on Joint Causes of Death for its "significant contribution not only in the development of uniformity in recorded causes of death, but extending that principle to morbidity, and for its part in developing international cooperation in the medical field". Dr. Lowell J. Reed, Chairman of the Committee, received the award on behalf of the group at the 75th annual meeting of the American Public Health Association held in Atlantic City in October.

The Lasker Awards of the American Public Health Association are presented annually by the Albert and Mary Lasker Foundation for outstanding work in the fields of medical research and public health administration. In making the award to the U. S. Committee on Joint Causes of Death, the Lasker Foundation recognized that the Committee's work "will greatly facilitate the exchange of statistical information on health and medicine between the countries of the world and serve as one of the effective links in binding them together under the banner of the United Nations".

Censuses of production and distribution in Great Britain

A partial Census of Production, covering the main capital goods and some other industries, was taken in Great Britain for the year 1946. This was the first census to be undertaken since 1937. Utilizing this experience, and with the help of an advisory committee and of trade associations, the Board of Trade is now preparing for a comprehensive Census of Production covering the year 1948. This census, to be taken early in 1949, will be the first of a series of annual surveys of production.

A national Census of Distribution is also contemplated for the year 1949. A pilot census for 1947 is now under way, covering all wholesale and retail and certain service establishments within the pilot area, which represents about five percent of the country. The Board of Trade expects to convene an advisory committee in May 1948 to advise it on the schedules for the first national Census of Distribution in the light of experience gained with the pilot census.

FAO 1947 Yearbook

The *FAO Yearbook of Food and Agricultural Statistics*, 1947, will include all the material covered in the 1946 edition issued in Rome as well as 1947 material, according to International Documents Service of Columbia University Press. Prepared by the FAO staff in Washington, it is to be published in a single bi-lingual English-French edition at $2.50 paper, $3.00 cloth. FAO published in January the *International Yearbook of Agricultural Statistics 1941–42 to 1945–46* in a three-volume set at $6.00. Subjects covered were agricultural production and numbers of livestock; international trade, and apportionment of areas, agricultural production and numbers of livestock in various countries.

Catalog of WPB reporting and application forms

A *Catalog of War Production Board Reporting and Application Forms* listing the 1,200 more important of the 4,400 forms through which WPB and industry communicated and by means of which WPB's wartime industrial controls were administered, has been completed. The selection and description of the forms was inaugurated by the War Production Board and has been carried on by successor agencies.

Indexes by WPB organization unit and by commodity are included. The set includes a facsimile of each selected form and a text describing commodity classification, WPB organizational units responsible for the form and returns, coverage and reliability, descriptions of tabulations made, reference to data published from these returns, and other information.

Since the agencies responsible for preparing the catalog have been liquidated, the Bureau of the Census is distributing the limited supply of these volumes. Requests for copies should be by letter to J. C. Capt, Director, Bureau of the Census, Washington 25, D. C.

SUMMER SESSIONS

University of Michigan offers survey research techniques

The University of Michigan Summer Session will offer a special four weeks session in survey research methods. The program will include introductory and advanced courses in survey research and sampling methods as well as a course in methods of statistical analysis. The survey research courses will cover study design, questionnaire construction, interview technique, coding methods, and related material.

The staff will include Rensis Likert, Angus Campbell, Charles Cannell, Roe Goodman, George Katona, Daniel Katz, Leslie Kish, Eleanor Maccoby, and Charles Metzner of the staff of the Survey Research Center. Morris Hansen, William Hurwitz, and Benjamin Tepping of the Bureau of the Census will offer the advanced sampling courses. Other special lecturers will participate in the program.

All courses will be given July 19 through August 13, 1948. In addition the introductory course in survey methods will be offered from June 21 to July 17. This will permit students to register for the introductory course for the first four weeks and advanced courses the second four weeks.

All courses are offered for graduate credit and students must be admitted by the Graduate School.

Inquiries should be addressed to the Survey Research Center, University of Michigan, Ann Arbor, Michigan.

Columbia University summer session

The 1948 Summer Session of Columbia University will include the following courses:

Statistical methods. (6 points) R. H. Ostheimer and A. J. Raebeck.

Advanced statistics in the social sciences: the fitting of frequency curves, tests of significance, and analysis of variance. (3 points) Professor D. J. Cowden.

Advanced statistics in the social sciences: time series analysis and correlation. (3 points) Professor D. J. Cowden.

Probability. (3 points) Professor Jacob Wolfowitz.

Statistical inference. (3 points) Professor Jacob Wolfowitz.

L. H. C. Tippett to lecture at Massachusetts Institute of Technology

Walter A. Shewhart to address final meeting.

L. H. C. Tippett, Chief Statistician of the British Cotton Industry Research Association, will give two series of lectures on statistical methods at the Massachusetts Institute of Technology this spring. The first series on Quality Control will be given Wednesday, May 5 through Friday, May 7, from 3 to 5 p.m. The second series on Experimentation will be given Wednesday, May 12 through Friday, May 14, from 3 to 5 p.m.

The series on "Statistical Methods for Industrial Quality Control" will include discussion of the specification of quality by statistical measures—frequency distributions, averages, measures of variation, percentages defective; the relation between tolerances and the percentage defective; control charts, their construction and interpretation—percentage defective, average, range, special adaptations; sampling schemes—single sampling, double sampling, sequential sampling. Emphasis will be laid on the rationale of quality control. A knowledge of elementary algebra, of simple average, and

of the elementary notions of probability will be assumed.

The lectures on "Statistical Methods for Technical Investigation and Experimentation" will deal with the treatment of experimental and observational errors by statistical sampling theory, the effect on inferences, the tests of significance, and the design of investigations and experiments to make inferences valid, will be explained with references to the simple comparison of the effects of two experimental treatments. More complicated investigations and experiments to investigate assignable causes of variation and to measure their importance, involving the statistical methods of correlation analysis and the analysis of variance, will be explained. The subject will be dealt with theoretically and practically, illustrated by the factory and laboratory. Knowledge of the subject matter of the first series of lectures and of algebra will be assumed.

The series will end with the dinner meeting, open to persons interested in statistical method in quality control and experimentation at which Walter A. Shewhart will speak on "The Future of Statistics in Industrial Research and Quality Control".

All correspondence concerning the sessions should be addressed to H. A. Freeman, Massachusetts Institute of Technology, Cambridge 39, Massachusetts.

MEETINGS

American Marketing Association

A Washington Conference of the American Marketing Association is to be held at the Hotel Statler, Washington, D. C., on June 14 and 15, 1948. Planning and direction of this meeting is in the hands of a special committee headed by A. Rex Johnson, Assistant Director of the Office of Foreign Agricultural Relations for the U. S. Department of Agriculture and president of the Washington Chapter of the American Marketing Association.

American Society for Testing Materials

The 1948 Annual Meeting of the American Society for Testing Materials, the 51st such session of this national technical organization, is to be held in Detroit the week beginning June 21. There will be some 20 technical sessions, with technical papers and reports in the field of materials. The Society's 8th Exhibit of Testing Apparatus and Related Equipment will be in progress during the week. A local Committee on Arrangements, headed by C. H. Fellows of the Detroit Edison Co., is in charge.

PUBLICATIONS

Bulletin of International Financial Statistics

Beginning with January, the International Monetary Fund has begun publication of a monthly statistical bulletin entitled *International Financial Statistics*. The bulletin contains statistics for about 60 countries, arranged by country, on exchange rates, gold production, gold and foreign exchange holdings, assets of the Central Banks and of Commercial Banks, interest rates, money supply, prices, foreign trade and production. Notes on the significance of the items carried are also included. Annual figures are shown for 1936 through 1947, and monthly figures for the last 18 months.

The bulletin also contains the balance sheets of the International Monetary Fund and the International Bank for Reconstruction and Development.

The annual subscription rate for the United States is $5.00. Subscriptions should be sent to the International Monetary Fund, Washington 6, D. C. Equivalent rates in other member countries will be accepted in local currency.

Economic development project

The United Nations Department of Economic Affairs began the publication of a series of studies on problems affecting the economies of the less developed countries with the report: *Economic Development in Selected Countries: Plans, Programmes and Agencies.* Sixteen areas are covered in the present volume; others are to be treated in a second volume that is in progress.

David Owen, UN Assistant Secretary-General, says in the foreword: "The report is of a descriptive nature; no analysis of the effects of governmentally planned or guided economic development on production, national income, standards of living, or foreign trade, is intended here. Such analysis is reserved for future studies, some of them already under way".

Statistical information in the report includes budget data and planning agency estimates. It is available from International Documents Service, Columbia University Press, New York 27, at $3.00.

FAO publishes economic review

The first issue of a new quarterly, the *Economic Review of Food and Agriculture,* has just been published by the Food and Agriculture Organization. The review is designed to provide current reports and interpretations of important aspects of the world food and agricultural situation.

The current issue gives the world-wide pattern of food production, trade, and consumption prospects during the 1947–48 crop consumption year. Recent trends in international trade policy and the development of various types of trade controls are also discussed.

Each succeeding issue of the quarterly will contain a review of the current world food situation. Material will also be included on commodity situations, agricultural legislation, credit, cooperatives, and labor, as well as reports of special studies made by FAO.

Copies of this 72-page printed review can be obtained from International Documents Service, Columbia University Press, 2960 Broadway, New York 27, N. Y., price 50 cents. The annual subscription price is $2.00. A French edition is in preparation.

The Role of a Statistical Consultant in a Research Organization

by CHURCHILL EISENHART
Chief, Statistical Engineering Laboratory, National Bureau of Standards

1. The primary function of a statistical consultant.

The primary function of a statistical consultant in a research organization is to furnish advice and guidance in the collection and use of numerical data to provide quantitative foundations for decisions. For, as W. Edwards Deming has said, " . . . the chief duty of a statistician is to interpret data in such a way that they convey knowledge for purposes of prediction; another is to collect data in such a way that they provide maximum information; and still a third function is to help bring about some changes in the sources of the data. There is no use in taking data if you do not intend to do something about the sources of the data."

Some may object that this attitude appears to be excessively pragmatistic—that study of the world to obtain knowledge for its own sake is an admissible occupation. True! But, it should be noted that the foregoing does not exclude description of the *status quo* as a means of understanding it, that is, to provide a basis for predicting the outcome of any course of action that could be taken. And research organizations generally take this attitude—they tend to agree with W. K. Clifford that "Every scientific fact is a short hand expression for a vast number of practical directions: if you want so-and-so, do so-and-so." Research organizations in the main study the world for a dual purpose: (a) to determine how it can be changed; and (b), to decide which one of the possible worlds should be made the real one.

2. The special tasks of a statistical consultant.

The special tasks of a statistical consultant as a member of a research team are:

(1) *To furnish advice and guidance in the* COLLECTION *of data.* This involves reaching agreement with the other members of the team on (a) *what* kinds of data are needed, (b) *how* they are to be collected, and (c) *how much* data is to be collected. When (a) has been settled in the light of the objectives of the investigation, the knowledge of the workers in the substantive field concerned, and whatever supplementary information is accessible, it becomes the lot of the statistical consultant to adapt or develop, alone or in cooperation with other members of the research team, (i) patterns for the collection of the data (designs for experiments, patterns for the stratification of sampling, etc.) and (ii) methods of collecting the data (taking measurements, drawing samples, etc.) such that the effects of uncontrolled factors may be expected to balance out with increased replication, valid adjustments can be made for known and/or likely sources of bias, and the reliability of predictions based on the data obtained can be adequately estimated from the data themselves and/or supplementary information. It may also be the lot of the statistical consultant to supervise the actual collection of the data, especially when the patterns and methods decided upon are novel to the personnel concerned.

(2) *To furnish advice and guidance in the* INTERPRETATION *of data, the formulation of conclusions, and the* PRESENTATION *of data as supporting evidence.* These three phases involve (a) knowledge of the data (especially, *how* they were collected) and the objectives of the investigation, (b) some experience with data in the substantive field concerned, and (c) use of the mathematical theory of probability to determine with what confidence predictions of a given type can be made from data

collected in a specified way and analysed in a prescribed manner. It also requires (d) knowledge and experience in the presentation of data as evidence in tabular or graphical form; by averages, measures of dispersion, regression equations, etc.; by the representation of nature by probability distributions involving parameters that can be estimated from the data; and so forth.

The special contributions of the statistical consultant are through (c) and (d): use of the mathematical theory of probability to determine what conclusions can be drawn and with what confidence; skill and experience in the presentation of data as evidence. The statistical consultant, in turn, is guided by the rule first explicitly stated, to my knowledge, by Walter A. Shewhart: "Original data should be presented in a way that will preserve the evidence in the original data for all the predictions assumed to be useful." This implies that if the data are presented in condensed form then their summary should not tend to "cause human action significantly different from what this action would be if the original [data] had been taken as a basis for evidence"—at least, so far as the set of "all the predictions assumed to be useful" is concerned. However, this raises the question: what is the set of "all the predictions assumed to be useful"? The answer appears to be: "We cannot have facts without some theory."

(3) *To furnish advice, guidance, and (on occasion) assistance in the* PROCESSING *of data prerequisite to their interpretation and presentation in summary form.* This requires knowledge of, or better, experience and skill with, the procedures of statistical analysis and the tools of numerical mathematics. The former include the procedures appropriate to analysis of variance and covariance, contingency tables and goodness of fit, correlation (inter-class and intra-class; simple, multiple, and partial; normal, serial and rank), estimation by a single value (method of moments, maximum likelihood, "close") and by intervals (confidence intervals and fiducial limits), fitting frequency curves and their integrals (logits, probits), graduation and smoothing, least squares and regression equations (simple, multiple, and partial; linear and curvilinear; orthogonal polynomials), oscillatory time series (Fourier series and periodogram analysis; autoregressive series and correlogram analysis), rejection of observations, tests of significance (single-, double-, multiple-, and sequential-sampling; parametric and nonparametric); and so forth. The tools of numerical mathematics include computing machines, tabulating machines, mathematical tables, nomograms, and other aids to computation that can make arithmetic less burdensome, if not yet a pleasure. Clearly no man can be thoroughly acquainted, experienced, and skilled with all of these procedures and tools. But there are times in the life of a statistical consultant when he wishes that he were!

3. Making effective use of the statistical consultant.

The cardinal rule for making effective use of the statistical consultant is

CALL IN THE STATISTICAL CONSULTANT
AT THE PLANNING STAGE OF AN INVESTIGATION.

This rule is appreciated in the United States more widely today than formerly. Its importance derives from the fact that the decisive step in every investigation is the collection of the basic data: *what* data are collected is determined by the objectives of the investigation, and in turn determines its scope; *how* the data are collected determines the character of the predictions that can be validly based upon them; and *how much* data is collected determines the reliance that can be placed in whatever predictions can be validly based upon them.

Too often in the past the statistician has been called in "to the rescue," so to speak, "when the ship was sinking, *and* doomed to sink" as a result of faulty or grossly inadequate procedures employed in collecting the basic data. In such cases, it is often impossible to draw with confidence any worthwhile conclusions from the data. Sometimes a few results can be salvaged, but at great cost and with some risk. Cases in point are conclusions reached by analysis of variance when there are disproportionate frequencies in the respective classes: the arithmetic is almost certain to be heavy and the conclusions reached may depend on whether certain interactions are assumed to be existent or nonexistent when the method of analysis is selected.

4. The statistical consultant as a coordinator of research.

Finally, in consequence of the broad applicability of statistical methods, the statistical consultant often performs another function, of supplementary nature, as he pursues his various tasks in the performance of his primary function: the statistical consultant becomes an informal coordinator of research, drawing to the attention of workers in one branch of the organization related research completed, in progress, or contemplated in another branch—research which, as Warren Weaver once put it, "involves the same verbs but different nouns".

Adapted from a paper of the same title presented to the International Statistical Institute, 10 September 1947.

The Examination of the Royal Statistical Society

by MAURICE G. KENDALL
Honorary Secretary, Royal Statistical Society

1. The extensive field of employment which was opened up to statisticians during the war brought with it a number of problems of training, organisation and professional standing. It became increasingly clear that some need existed for a means of giving proper status to persons engaged in statistical work, not only in their own interests but also in those of employers, who were finding considerable difficulty in assessing the qualifications of applicants for statistical posts because of the lack of an adequate standard. On the whole the Universities were not meeting this need even for their own students, since many of them had no tuition covering the full field of statistics, and the standards and curricula varied so widely that no uniformity of qualifications could be provided. Moreover, there was a large class of persons who did not become interested in statistics until they had made considerable progress with their careers in business or the Civil Service and were thus unable to attend University courses with a view to graduating.

2. In July 1943 the Council of the Royal Statistical Society accordingly appointed a Committee to consider "whether any measures were desirable to regularise the professional and scientific status of persons engaged partly or wholly in statistical work" and if so to draft some proposals. This Committee, under the Chairmanship of the then President, Dr. E. C. Snow, presented a final report which was, with slight amendments, adopted by the Council in April 1944. The report expressed the hope that increasing facilities would be provided by Universities and proposed that the Society itself should assume the additional functions of an examining body and should confer Certificates and Diplomas in statistics, the former on a lower level below degree standard, the latter at about degree standard. It set out tentative syllabuses for examinations for these two qualifications and pointed out that under the constitution of the Society a Supplemental Charter would be necessary to enable the proposals to be put into effect. These proposals were approved by the Society in General Meeting and a petition lodged in October 1944.

3. To make the position clear to American observers it must be explained that the Royal Statistical Society operates under a Royal Charter, which defines the Society's functions and constitution in general terms, and under Bye-laws which are made by the Society within the terms of the charter. No amendment to the charter can be made without a formal petition to His Majesty (which in practice means an application to the Privy Council). Such application has to be advertised so that any person who wishes may lodge an objection.

4. From the outset, there was some objection to the Society's proposals from a small group of economists and economic statisticians who lodged a counter-petition with the Privy Council.

In accordance with normal procedure, an attempt was made to reach agreement with the counter-petitioners and with the Royal Economic Society, who had in the meanwhile written to the Privy Council objecting to the Society's proposals, but no acceptable compromise was found possible. The Society was ultimately advised that in view of this opposition it was unlikely that a Supplemental Charter would be granted and therefore decided to withdraw the application. It was found, however, that if the Society confined its examinations to its own Fellows, these could be held under the powers given by its present Charter and the necessary authority was given to the Council by the adoption of the following Bye-law on November 7, 1946:—

> "The Council may at any time cause examinations to be held for the purpose of testing the statistical proficiency of such Fellows as may desire to submit themselves for examination. The Council shall determine the subjects to be comprised in such examination, the manner in which such examination shall be conducted, fees to be paid to examiners, whether Fellows or not, and the fees to be paid by examinees. Such examinations shall be open to every Fellow, and every successful examinee shall be granted a certificate stating the nature of the examination which he has passed."

5. The way was now clear, and on November 13, 1946 the Council appointed a Committee under my Chairmanship to prepare proposals arising out of this Bye-law, my fellow members being

Professor R. G. D. Allen, Mr. D. J. Finney, Mr. R. F. George, Professor Major Greenwood and Dr. David Heron. In May 1947 we presented a report which, with minor modifications, was approved by the Council. This report dealt only with the Certificate. A second report on the Diploma will appear later.

6. The report on the Certificate has appended to it General Regulations for the 1947 examinations, which include a syllabus and six specimen papers. It will in due course be published in the *Journal* of the Society. The first examination was to be held in London in December 1947, the second in September 1948, and the third in April 1949, after which it is expected that an examination will be held annually in April. The substance of the report lies in the syllabus and the specimen papers, but the following two paragraphs of the report itself may be of interest:—

"The only point on which the Committee wish to comment is that of exemptions. They have very carefully considered the desirability and practicability of allowing exemptions from parts of the Certificate examination, and have come to the conclusion that none should be granted. The main argument in favour of exemption is that the candidate seeking it is already of the standard required, and therefore should not be asked to waste time in submitting himself to a fresh examination. But this argument has two edges, for a candidate who already has the ability to pass the examination does not suffer serious hardship from the requirement that he should take it. Nor will the expense be great. On the other hand, the arguments against exemption appear to the Committee to be so strong as to be decisive. The examination standards vary very much from one institution to another and to specify exemptions would throw on the Society the invidious task of expressing an opinion on the standards of certain outside examinations. The Committee think that the only rule which will avoid complication and dispute is to permit no exemption."

"It has been stated on the Society's behalf on several occasions that in formulating proposals for examinations for its Fellows the Society has no intention of providing courses of instruction or of engaging in any form of teaching. Nevertheless the Committee feel that the Council might properly give some help to candidates in planning their studies. They suggest that the permanent Examinations Committee should be asked to advise the Assistant Secretary in dealing with applications from Fellows for assistance in the choice of reading for the Certificate."

7. The Syllabus of the 1947 Certificate Examination is as follows:

"To obtain the certificate candidates must have passed the four sections A, B, C and D below. One paper of three hours will be set in each section.

The mathematics required will be approximately of the standard of Elementary Mathematics in the Matriculation Examination of London University, and the emphasis will be on statistical methods and ideas rather than on mathematical analysis. Squared paper and logarithm tables will be supplied.

Candidates may use their own slide rules.

Section A

Nature and scope of statistical inquiries.

Design of questionnaires.

Classification and tabulation; continuous and discontinuous variation.

General acquaintance with official statistics and other sources of existing material.

Errors and defects in published material.

Pitfalls in interpretation.

Graphical presentation of results.

Elementary statistical reasoning.

Section B

Descriptive properties of frequency distribution.

Nature and calculation of averages and measures of dispersion, means, medians, modes, quartiles, interquartile range, standard deviation.

Elementary theory of index numbers.

Association, contingency and the elements of linear regression and correlation (partial and multiple correlation and regression not required).

Elements of interpolation and graduation.

The fitting of straight lines and parabolas. Elementary analysis of time-series; moving averages, trend lines (but not analysis of oscillatory movements).

Section C

Elements of probability as applied to statistics.

Sampling methods.

Properties of the binomial, Poisson and normal distributions.

Sampling error. Standard errors of commoner statistical measures.

Tests of significance and x^2 goodness to fit; simple applications of the t and z tests. (Proofs will not be required).

Elements of experimental design and analysis.

Elements of statistical quality control.

CONTINUED ON PAGE 15

A Program of Action for Promoting Statistical Education in the Western Hemisphere

by ROBERTO GUYE
Secretary of the Committee on Statistical Education
Inter American Statistical Institute

Extensive consideration was given to problems of statistical education in the Western Hemisphere during the First Session of the Inter American Statistical Institute (IASI), held in Washington in September 1947. A broad program of action was laid down in the form of 10 resolutions[1] based on the preparatory work done by the IASI Committee on Statistical Education.[2] This preliminary work included two special reports; one by Milton da Silva Rodrigues analyzing the results of two inquiries made by the IASI on the characteristics of statistical teaching in the Western Hemisphere and discussing various aspects of the problem; the other by Carlos E. Dieulefait and Roberto Guye, dealing with plans of study for the training of advanced statistical technicians.[3] Reports issued on similar problems by committees set up by other institutions, namely, the U. S. National Research Council and the U. S. Institute of Mathematical Statistics, were also fully taken into account.[4]

The various topics covered by the resolutions can be grouped under four headings.

I. General Organization of Statistical Teaching (resolutions Nos. 20, 21 and 22).

It is recommended that statistical education be organized at various levels, in different types of teaching institutions, in order to cover different needs:

1) *in secondary and intermediate schools,* elements of statistics should be taught according to the character of the school, i.e., in commercial schools, statistics should be taught with special reference to economic and business problems; in normal schools, with particular application to problems of education; in other schools, mainly as illustration in courses in arithmetic, algebra, geography, etc.;

2) in *universities* the statistical teaching should be organized in connection with practically every subject field of studies, but answering different purposes:

a) in fields in which statistics has little direct application, an introduction to statistical theory with broad applications should be taught as an element of general culture;

b) in fields in which statistics has important applications (political, economic and social sciences, medicine and hygiene, agronomy, engineering, education and psychology, etc.), graduates should have received enough statistical training to be able to use statistical methods for their professional needs; the courses should include: i) statistical procedures and practices; ii) statistical theory (introductory and more advanced); iii) advanced applied statistics (econometrics, biometry, psychometry, etc., according to the case);

c) in addition to the above-mentioned statistical training given as a part of the general academic studies, a limited number of universities should provide special courses of study to train various types of professional statistical technicians, for which corresponding titles, diplomas, or credits should be granted.

A Department or Institute of Statistics, constituting a center of statistical research around which the different courses of statistics within the university can be grouped, appears an appropriate means to organize such broad and diversified teaching.

[1] "Resolutions of the First Session of the Inter American Statistical Institute, Washington, D. C., September 6–8, 1947." Part II. IASI. (Document: 322a II). To appear also in *Estadística*, Journal of the Inter American Statistical Institute, vol. VI, no. 18, March 1948.

[2] This Committee, set up in 1946 by the IASI Executive Committee, was composed as follows: Chairman—Carlos E. Dieulefait, Professor of Statistics and Director of the Institute of Statistics, University of the Litoral (Argentina). Secretary—Roberto Guye, Technical Representative in South America of the IASI, former Professor of Statistics, University of Cuyo (Argentina). Members—Jorge Kingston, Professor of Statistics, University of Brazil (Brazil); Milton da Silva Rodrigues, Professor of Statistics, University of São Paulo (Brazil); Domingo Almendras, Professor of Mathematics and Statistics, University of Chile (Chile); Flavián Levine, Professor of Econometrics, University of Chile (Chile); William G. Cochran, Professor of Mathematical Statistics, Iowa State College, and Associate Director, Institute of Statistics, University of North Carolina (U.S.A.); W. Edwards Deming, Director of the Department of Mathematics and Statistics, Graduate School of the Department of Agriculture (U.S.A.).

[3] "Statistical Teaching in the Western Hemisphere", by Milton da Silva Rodrigues. IASI. Washington, D. C., August 1947. (Document 301).
"Minimum Plans of Study for the Training of Statistical Technicians", by Carlos E. Dieulefait and Roberto Guye. IASI. Washington, D. C., August 1947. (Document 306a). To appear in final form in the IASI volume of the proceedings of the International Statistical Conferences.

[4] See summary of these two reports in *The American Statistician*, Vol. I, Nos. 2 and 3, Oct. and Dec. 1947.

3) *Professional courses* for the training of the subordinate and intermediate technical personnel of the public statistical services should be organized by those services as a necessary complement—avoiding duplication—to the general teaching in statistics which is given in secondary schools and centers of higher learning. Seminars open to intermediate and advanced technicians, organized within the statistical services or apart from them in a scientific society, are recommended as a means for exchanging information resulting from their varying experiences and for keeping current their knowledge of the latest advances of statistics.

4) Similarly, the organization in a few countries of *inter-American courses or schools of advanced statistical training* is suggested in order to offer the complementary and specialized training which the higher statistical technicians require, especially when adequate opportunities as specified under 2c are not available in the academic institutions of the country. Such courses, either general in character or limited to a specific statistical branch, would be open to technicians of different countries, and scholarships should facilitate their attendance.

II. Plans of Study for the Training of Advanced Statistical Technicians (resolution No. 23).

Such plans of study concern mainly the training of professional statistical technicians, either in universities (as suggested above under I 2c) or, in certain cases, in inter-American courses of advanced statistical training (I 4 above).

1) *The training of three types of statistical technicians.* The knowledge, experience and capacity required for discharging the duties of the advanced technical personnel of statistical services have become so broad, complex and diverse that division of labor and professional specialization in some aspects of statistics have become an imperative necessity. It is therefore suggested that the courses of study should be planned in order to prepare three types of statistical technicians: a) the mathematical statistician; b) the statistical analyst; c) the statistical administrator.

The differentiation between these three kinds of training would result from giving more or less emphasis to three fundamental aspects of statistical knowledge and activity, i.e., a) statistical theory and its mathematical background; b) the statistical procedures used in collecting and preparing the data and the required statistical organization; c) the general subject fields to which statistical analysis would be applied. Scheme I outlines in a summary way how these three aspects should be stressed in training the three types of statisticians.

In terms of academic curriculums in use in the U. S., the title of "mathematical statistician" would correspond approximately to a Ph.D. in mathematical statistics with minors in one subject field; the "statistical analyst" to a postgraduate course in statistics open to graduates in different subject fields (from B.A. to Ph.D., according to the case); "the statistical

SCHEME I

Knowledge Required of Different Types of Statistical Technicians

Type of statistical technicians	Statistical theory (with mathematical background)	Statistical procedures[a] (with administrative complements)	General subject fields[b] (to which statistical analysis applies)
A. Mathematical statistician	Advanced (with thorough background in mathematics)	Intermediate (in a few fields)	Intermediate (in one or two subject fields)
B. Statistical analyst	Intermediate	Advanced, but limited to the field of specialization	Advanced, in subject fields of specialization[c]
C. Statistical administrator	Elementary	Advanced and extensive (with thorough background in administration)	Elementary (in several subject fields)

[a] Statistical definition of the problem; definition and classification of statistical units; methods of collecting and preparing the data; current deficiencies of data and resulting limitations; etc.

[b] Subject fields related to: economic science; social science; political science and administration; agronomy; engineering; medicine and public health; education and psychology; natural sciences; etc.

[c] For example: doctor in economics; doctor in social sciences; agronomist; engineer; doctor of medicine; etc.

SCHEME II

Principal Technical Functions and Posts Corresponding to the Different Types of Statistical Technicians

A. Mathematical Statistician

1. PRINCIPAL TECHNICAL FUNCTIONS:

Collaboration in planning of surveys and in execution of statistical analysis, especially when it is necessary to formulate new or highly mathematical theories and techniques. Design of experiments. Planning of surveys to be done by sampling and application of statistical inference and estimation techniques to such data. Research on bias. Research on cost in investigations. Advice to directors general or chiefs of units who are statistical administrators or statistical analysts, on any point related to preparation or analysis of data which lends itself to special mathematical treatment.

2. POSTS (illustrative examples):

a. Director general, assisted by a subdirector who is a statistical administrator.
b. Technical consultant to a director general or to a chief of a unit.
c. Chief of a unit (especially of a unit in charge of a sample survey) with the assistance, if necessary, of a statistical analyst specializing in the subject field of the research.

B. Statistical Analyst—(Specialist in a Particular Subject Field)

1. PRINCIPAL TECHNICAL FUNCTIONS:

Formulation of programs of statistical research in the field of specialization (economics, public health, education, etc.) and supervision of their execution. Application of statistical techniques to the data collected for the purpose of giving answers to the questions propounded by the administration, if necessary with the collaboration of a mathematical statistician.

2. POSTS (illustrative examples):

a. Director general, assisted by a subdirector who is a statistical administrator.
b. Technical consultant to a director general or to a chief of a unit.
c. Chief of a specialized unit.

C. Statistical Administrator

1. PRINCIPAL TECHNICAL FUNCTIONS:

Direction and supervision of the various steps of collection, compilation, editing, tabulating, and tabular or graphic presentation of the data. Cooperation with statistical analysts and mathematical statisticians in framing programs for statistical research and in analysis of the data.

2. POSTS (illustrative examples):

a. Director general, with statistical analysts and mathematical statisticians as consultants.
b. Subdirector or subchief of a unit, under a director general or chief who is a statistical analyst or a mathematical statistician.
c. Chief of a non-specialized unit.

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administrator'' to a B.A. or M.A. in statistics with minors in some general subject fields.

2) *Characteristics of the three types of technicians.* Each type of technician thus trained would be better prepared for performing special technical functions. In a statistical service, however, a given function does not correspond necessarily to a given post, as division of labor and relationships between heads, subheads and consultants can be arranged in different ways, according to the prevailing customs, the resources available, the field of statistical application.

Scheme II illustrates briefly these two points by way of example.

III. Teaching Material (resolutions Nos. 26, 27, 28).

Recommendations are made with the objects of promoting, through the action of the IASI Committee on Statistical Education, the publication of adequate teaching material, especially in Spanish and Portuguese, and of informing the statistical teachers in different countries of all interesting material available in the Hemisphere. It is suggested that efforts be made

1) as regards *statistical theory,* to promote either the translation into Spanish or Portuguese of outstanding textbooks existing in other languages, or the publication of a series of manuals, each one covering a chapter of a general course of statistics; also to maintain an up-to-date selected bibliography of statistical textbooks;

2) as regards *statistical procedures in the different statistical fields* (on which very little teaching material is available), to promote the publication of a series of manuals, by different experts, but according to a systematic plan, on the statistical procedures and practices in various fields, i.e., population census, vital statistics, agriculture, mining, foreign trade, labor statistics, etc.;

3) as regards *practical exercises in statistical laboratory problems*, to edit a few "laboratory manuals" or "workbooks", taking advantage of the experience acquired in various teaching centers, and to publish a selected bibliography of such material.

IV. Statistical Teachers, Statistical Personnel, Statistical Associations and Congresses (resolutions Nos. 24, 25, 29).

1) *Statistical teachers.* As the program outlined above cannot be carried out without there being available a more adequate number of highly qualified teachers than now exists in the different countries, the imperative necessity of offering opportunities for training those teachers is stressed with special emphasis. Courses should be organized without delay in the institutions which today offer the highest training in statistics; special attention should be given also to this point in the inter American schools suggested above. Scholarships should be granted for that purpose.

2) *Statistical personnel.* As it is to the best interest of the public statistical services to attract and to keep highly trained technical personnel and as this training requires large expenditure of energy, time and financial resources, of which maximum advantage should be taken, it is recommended, as the best way of achieving this purpose, that stability of employment, suitable remuneration and social security be guaranteed by regular legislation to such technical personnel, and that their conditions of recruitment and promotion be established according to strictly technical standards.

3) *Statistical associations and congresses.* As it is also important that, besides the various possibilities of regular training mentioned above (see I), the statistical technicians and members of other professions using statistics in their studies should have opportunities to broaden or keep up-to-date their knowledge, the role which the national statistical associations in different countries can play in that respect is stressed. National statistical congresses should be organized periodically, with all the necessary support and facilities. Special attention should be given to the younger generations of statisticians and, besides various measures to attract them into the national associations, it is suggested that the IASI Committee on Statistical Education should promote periodically, in collaboration with the national societies, the organization of inter-American statistical contests.

The recommendations summarized above constitute a long range and far-reaching program. It has some chance of being put into practice only if responsible circles in the different countries take its realization into their hands. It is now one of the major tasks of the IASI Committee on Statistical Education to see that steps be taken in that direction.

STATISTICAL POSITIONS IN THE FEDERAL SERVICE CONTINUED FROM PAGE 1

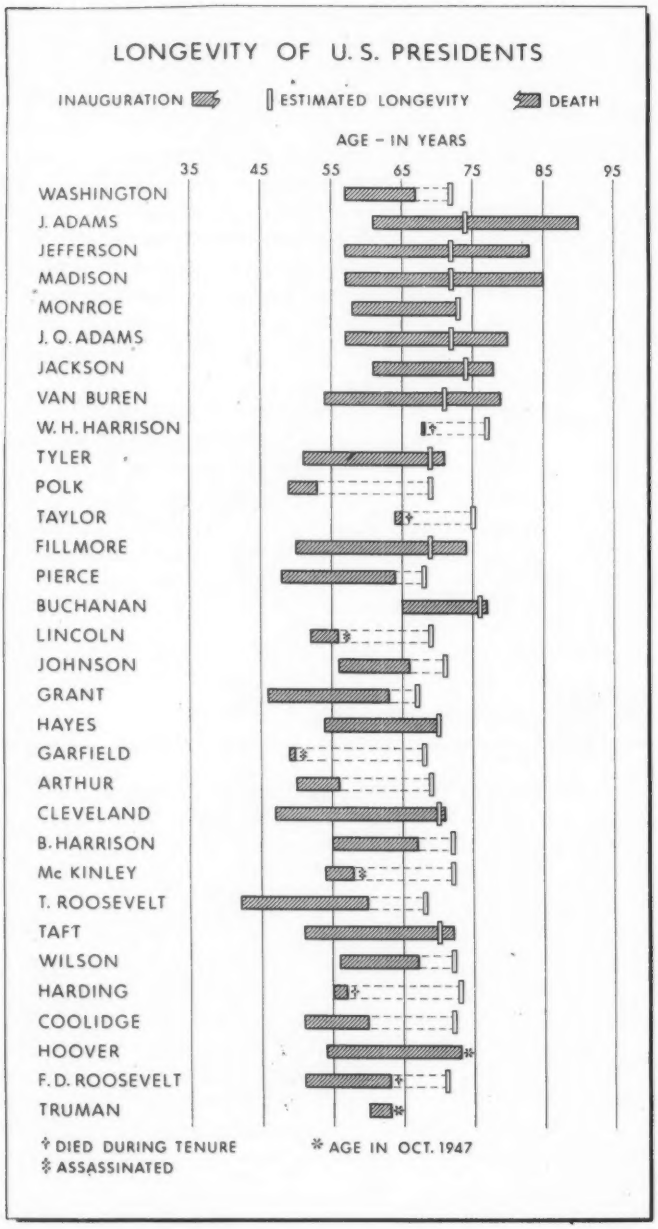
As an analyzer and interpreter of data, the professional statistician differs from the subject-matter specialist (e.g. economist, sociologist, biologist, physicist, engineer, etc.) in that *the statistician has a major responsibility for the selection and application of statistical methods of analysis, interpretation, and presentation of data*, whereas *the major responsibility of the subject-matter specialist is the determination and expression of what the data signify with respect to the subject-field*, that is, what they contribute to the knowledge and understanding of the subject-field, what relationships they disclose, what procedures they imply for achieving desired ends.

For the statistician thorough knowledge and competence with statistical methods is of primary importance, although an extensive knowledge of a specialized subject-field ordinarily is essential. For the subject-matter specialist, on the other hand, a thorough knowledge of subject-matter is of primary importance, knowledge of statistical methods of secondary importance.

It is encouraging to note that the Civil Service Commission is making a serious attempt to raise professional standards in statistics within the Federal Government by clarifying the responsibilities of statistical positions to reflect modern developments in statistical theory and practice. Needless to say, the establishment of standards for the Federal Service will be reflected in other professional statistical positions in state and local governments and in private industry as well.

THE EDITORS

Does the Presidency Shorten Life?

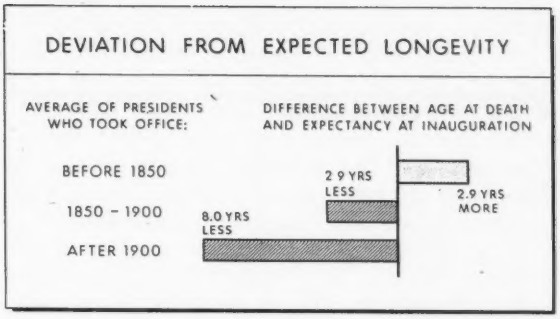


Only twelve of our thirty deceased Presidents outlived their expectation of life at inauguration, and the long-lived executives were concentrated, for the most part, in the earlier period of the Nation's history. Of our first ten Presidents, eight lived beyond their inauguration for more years than would have been expected on the basis of mortality conditions then prevailing; the exceptions are George Washington and William H. Harrison. On the other hand, of our Chief Executives since 1900, only William Howard Taft survived his expectation of life at inauguration. Herbert Hoover, our only living ex-President, has practically reached the mark, while the present incumbent—Harry S. Truman—has many years to go before attaining the expectation of life reckoned from his inauguration. The chart shows, for each President, the age at inauguration, the actual age at death, and the expected age at death according to mortality conditions prevailing about the time of his inauguration.

Our Presidents are, with few exceptions, well in or past midlife by the time they enter their high office. The youngest was Theodore Roosevelt, who was only 42 years of age at inauguration. Five were between 45 and 49 years of age; eleven between 50 and 54; nine between 55 and 59; four between 60 and 64; and only two were over 65. The oldest, William Henry Harrison, died one month after taking office at age 68. Except for President Truman, none of our Chief Executives since Buchanan (inaugurated in 1857) had passed his 60th birthday before inauguration. In contrast to an average age of $58\frac{1}{3}$ years at inauguration for those taking office before 1850, the succeeding incumbents averaged 52 years.

Reprinted from the *Statistical Bulletin*, Metropolitan Life Insurance Company, October 1946.

The physical and mental strains in rendering executive decisions in a highly industrialized nation of 140,000,000 people undoubtedly exceed the burdens that were imposed by an essentially agricultural economy of a few million persons. In order to help ascertain whether the added burdens of our later Presidents have affected their length of life, a comparison was made of their expectations at inauguration with the years of life actually lived from that date to death. This comparison excludes William Henry Harrison, who served only one month, and Presidents Lincoln, Garfield, and McKinley, all of whom were assassinated. On this basis, it was found that the Presidents who took office before 1850 outlived their expectation of life at inauguration by an average of 2.9 years. On the other hand, the Presidents who served from 1850 to 1900 fell short of their expectation of life at inauguration by an average of 2.9 years. The deficiency is increased to about six years when the three Presidents who were assassinated are included in the computations for this half century. The Presidents who have held office during the present century have made an even poorer record; their length of life since inauguration has been, on an average, eight years less than their expectation of life at the time of taking office. Even if allowance is made for the exclusion of Herbert Hoover from this group, the difference is still appreciable.



It can hardly be inferred from these figures alone that the Presidency now takes years of life from its incumbents. There are other factors to be considered, such as the burdens of their public services before taking office. It is true, however, that unsuccessful candidates for the Presidency have fared much better, on the whole, with respect to longevity than have those who were elected to national leadership.

THE EXAMINATION OF THE ROYAL STATISTICAL SOCIETY CONTINUED FROM PAGE 9

Section D

An essay on one of a number of general statistical subjects.

Practical exercises in the application of the methods covered by Section A, B, and C to the analysis of numerical data."

8. The Council has appointed a Permanent Examinations Committee under the Chairmanship of Dr. David Heron (the present President of the Society) to supervise the arrangements for this and subsequent examinations, and also to submit proposals regarding the Diploma. This Committee has already made arrangements for the examinations of December 1947, and is at work at a report on the Diploma itself.

9. Taken in conjunction with the Society's Report on the Teaching of Statistics, prepared by Professor E. S. Pearson's Committee, the work on examinations represents a great amount of effort which will, I hope, do much to raise the standard of statistical instruction in the United Kingdom, to provide students of statistics with a programme of studies, and to give employers some kind of guide to the qualifications of applicants for statistical posts. The main drawback of the Society's system is that it applies only to Fellows; but there is nothing to prevent other bodies which are less restricted by their constitution from following the Society's lead, or from drawing on the Society's knowledge and experience. The last thing the Society would wish to do is to patent these examinations, or to restrict their field of application. Even if there were no candidates for the examinations (and there are, in fact, twenty-nine for the first) I would still regard the Society's work as worth while in the indirect effect it is having on the general standard of statistical teaching and the raising of the status of the statistical profession.

On the Classification of Statisticians

by W. EDWARDS DEMING
Bureau of the Budget

The Editors of *The American Statistician* feel that the present effort of the U. S. Civil Service Commission to classify statistical positions in the Federal Service is a matter of interest to the entire profession. Dr. Deming was invited to present his views on this subject since he has been particularly concerned with the problem of definition and classification.

I

The Civil Service Commission, which is responsible for the description and classification of the jobs of Federal government personnel, is faced with the difficult task of revising its description of professional statisticians in order to keep up with developments in the statistical field. It is pleasing to record that the Commission is seeking the aid of a joint committee of the American Statistical Association and the Institute of Mathematical Statistics, which has been appointed to examine the structure of statistical positions in respect to duties and classification. The problem is not only one of describing statistical work but of describing what statistical work is not: otherwise the work of the Civil Service Commission will be made intolerably complex through the difficulty of distinguishing between work in statistics and work in economics or other fields.

It is important that the Civil Service Commission give recognition to the advances in statistical methodology. Many of these advances have been developed by workers in the government service, and in the interest of government economy it should continue to be so. A muddle of classification, however, might conceivably drive some of our best statisticians out of government service and work a detriment to the statistical profession as a whole.

II

There is only one kind of whiskey, but two broad classes of data, good and bad. The advances of statistical methodology have started a decided movement toward preference for good data. This movement clashes with the supposition that bad data are better than none at all, and that good information is too expensive. It has learned that through advances in methodology, theory, and practice, particularly in the techniques of interviewing and sampling,

i. Information can be obtained in subjects which were not measurable a few years ago;

ii. The cost of good data has been greatly reduced;

iii. The time-interval between collection and tabulation has been greatly reduced.

Probably most important, good data are often cheaper at almost any price than a costly wrong decision based on wrong information. The tenet that some figure, no matter how bad, is better than none, is definitely on the defensive.

Good data are obtained through proper statistical planning. This planning necessarily involves *i.* the latest techniques in the psychology of interviewing: *ii.* careful attention to meaningful definitions and classification: and *iii.* use of the theory of probability in design and analysis.

It should be emphasized that the statistician is not necessarily abler at handling bad data than his colleagues trained in economics, sociology, engineering, physics, business, etc. However, because of the high transferability of the statistician's mathematical techniques, and because he acquires broad knowledge in many fields, he is frequently adept at discovering and measuring errors in data and determining the sources of the errors. He avoids drawing wrong conclusions from data whether they be good or bad. He will not, for example, draw inferences from just any set of cases; he seeks to know whether these cases constitute a validly drawn sample, and if so, the basis on which the sample was drawn. For example, did the data just happen to come in as a 30 percent response? As the first 500 returns to a questionnaire? In engineering design and research, the lack of randomness in data likewise plays a crucial role.

In industrial fields such as the design of manufacturing processes, testing of models, testing of materials and products, performance of personnel, analysis of costs and scheduling, recent impact of the statistician has been as revolutionary as in social and economic surveys.

III

A government statistical program involves various kinds of statistical work as well as some activities that are not statistical at all. Probably the most valuable man in a statistical organization is the one who can get the money to operate the program, and the next best man is the one who can keep the consumers and other statistical agencies satisfied and happy. These are not statistical jobs, but they are part of the statistical machine.

A good statistical program for either government or industry must be comprehensive and timely. It should aim at the production of adequate quantitative information of measurable reliability on as broad a front as funds will permit, and in time to be useful. For example, one must look ahead and perceive that two years or perhaps even ten years from now da'a on present conditions will be urgently needed for evaluating trends and changes. One area of statistical information must not be overworked while other areas remain untouched. As Yates puts it, "Knowledge of every detail of the process of agriculture in one small part of the country is of little use when other parts may be developing on entirely different lines." (*J. Royal Soc. Arts;* vol. xci, 1943: pp. 367–79.)

The attainments of comprehensiveness and timeliness are mainly the contributions of experts in subject-matter, and the importance of these characteristics cannot be overestimated; without them the attainment of the other desirable characteristics of speed, reliability, economy, validity, and accuracy of interpretation are insufficient for the success of the program.

However, once the content and timing of a program have been decided, and funds obtained, the planning, interpretation, and presentation which make up the statistical program are to a large extent methodological, provided good data are intended. But if the aim of the agency is merely to get figures, no matter how, then the expert in statistical methodology is not in a position to make his best contribution. Biased and inadequate methods of collecting data cannot suddenly be displaced by more reliable methods, hence for a long time ahead, and perhaps always, the statistician in many positions will have to expend part of his effort on bad data, which means that his duties will frequently be confused with the duties of the economist or engineer. But wherever he is, the statistician because of his specialized knowledge of statistical theory will make contributions otherwise impossible. Although 95 percent of his time may be occupied with subject-matter and red tape, and only 5 percent in the use of statistical theory and method, yet in this 5 percent of his time he will effect economies of operation and enhanced reliability in collection and analysis that would otherwise not be made.

IV

Briefly stated the statistician's specialty is *method, design:* How to do it better and cheaper? What questions to ask? What precision is needed? How best to carry out the survey or experiment to provide the information desired with the desired precision and no more? What will it cost? How to get objective measures of the sampling errors and biases, so that the reliability of the results can be assessed and methods improved? To him, the theoretical aspects of the design of surveys and experiments consist of three major problems. He must

Specify the reliability to be aimed at, in view of the allowable cost.

> A suitable specification of reliability will consist of an aimed-at precision (such as a coefficient of variation of 1 percent, 5 percent, or 25 percent in some important characteristic). In addition, in order to achieve better interpretation of the data, the specifications may require measurements of the differences between various procedures (two or more different ways of stating the questions, different methods of training the interviewers, different definitions, etc.).

Design the survey or experiment so that it will produce the prescribed precision at the lowest possible cost and with the personnel and physical facilities likely to be available.

> If the expected cost appears to be too great, the preceding step must be reconsidered, the scope of the survey narrowed, the prescribed precision relaxed; or perhaps abandonment of the undertaking.

Appraise the precision actually attained in several important characteristics and evaluate the differences between the various procedures specified for comparison; also, compute the costs of various phases of the undertaking or evaluate any remaining variances or other statistical measures that will be useful in cutting the costs or increasing the reliability of future studies of this character.

In modern statistical practice, through the use of the theory of probability, these three problems of design are related. Each reacts on the other. The specification of the precision to be aimed at is not definitely settled until some work has been done on the second. Preliminary calculations of costs and expected precision may show, for instance, that the survey that was contemplated will be too costly, whereupon the formulation of the aims of the survey must in part be revised. Conversely, one can not start laying out the

CONTINUED ON PAGE 19

QUESTIONS and ANSWERS

edited by FREDERICK MOSTELLER
Harvard University

NEGATIVE NUMBERS AND SEMILOG PAPER

Question 9. I would appreciate an answer to the following question regarding the use of ratio paper in plotting net income: Since ratio paper does not have a zero reference line, one cannot, technically, plot profits which later run into losses, or losses which later become profits. How would you recommend handling this problem without losing the advantage of ratio paper?

Answer. There is no satisfactory solution to this problem. Since a logarithmic scale is a scale of multiplication (or division) rather than a scale of addition (or subtraction), it is technically impossible to reach zero on such a scale and therefore impossible to extend below zero. Despite this obstacle, determined attempts have been made to overcome this alleged deficiency of the logarithmic scale.

The most familiar method is to plot the negative values on an inverted grid, placed below the grid showing positive values. Forgetting the technical impropriety of this solution, and considering only its usefulness, it still falls short of its purpose. The cardinal fact of semi-log presentation is that a constant percentage change appears as a straight line. However, because a given *percentage* change produces a different *angle* of change when it is an increase than when a decrease, a given percentage *increase in losses* (plotted on the inverted grid) will not have the same angle of change as the same percentage *decrease in profits* (plotted on the right-side-up grid). In other words, the "constant" change from highest profit to lowest loss will not fulfill the requirement of producing a straight line, but will bend at the point where profits become losses.

Although it is perhaps begging the question, I think that the use of a logarithmic scale for presenting profit and loss data would generally be of limited value even if it were possible. Rate of profit, in the sense of the ratio of profits to some appropriate base such as capital investment, or gross income, seems to be a more meaningful measure of profit than total amount of profit plotted on a semi-log chart. Of course, I am not acquainted with the specific problem you have in mind and it is possible that the logarithmic scale is the only appropriate method for its solution. In any event, there is no way to retain either the logarithmic scale or its advantages and at the same time show both negative and positive values.

Kenneth W. Haemer

DRAWING FROM JURY BOXES

Question 10. Will you answer the following and suggest a formula if there is one available:

1. There are 36 men in a jury box, 24 white, 12 Negro. Twelve jurors are drawn, one at a time. The chances of obtaining a white juror on the first draw is, of course, two to one. What is the chance that the twelfth draw will be white?

2. If the chance of the second and subsequent draw producing a white juror is less than two to one (and it seems it would be) how many white jurors would be obtained on the twelve draws, 8 or 7?

Answer. We suppose that the slips on which the names are written all have an equal chance of being drawn on the first draw, that those remaining have an equal chance on the second draw, and so on.

In general if there are a total of N things of which N_1 are of one type and N_2 are of another, the probability of getting x objects of the first kind in a random sample of size n is given by the formula

$$P(x) = C_x^{N_1} C_{n-x}^{N_2} / C_n^N, \text{ where } C_V^U = U!/V!(U-V)! \text{ and}$$
$$U! = U(U-1)(U-2) \ldots 3 \cdot 2 \cdot 1.$$

To elaborate, the number of different ways of getting x objects from among the N_1 is given by $C_x^{N_1}$. For each of these ways of getting x objects from N_1 there are $C_{n-x}^{N_2}$ ways of getting $n-x$ objects from the N_2 objects of the other kind, so the total number of different ways is the product of these, given in the numerator of $P(x)$. Similarly the total number of ways of getting n objects from among N with no restrictions is C_n^N, which appears in the denominator of $P(x)$.

For the particular example given here we are drawing a sample of $n = 12$, from a box containing $N_1 = 24$ slips with the names of whites and $N_2 = 12$ slips with the names of Negroes, and $N = N_1 + N_2 = 24 + 12 = 36$.

Computation indicates that the probability of getting $x = 0, 1, 2, \ldots, 12$ whites in our sample is given approximately by the following table:

x	p	x	p
0	.0000	6	.0994
1	.0000	7	.2190
2	.0000	8	.2908
3	.0004	9	.2299
4	.0042	10	.1034
5	.0269	11	.0239
		12	.0022

Naturally all thirteen outcomes are possible, but the most likely outcome of the drawing is 8 white jurors. In this particular case the mean number of white jurors is also 8. The general formula for the mean number of white jurors is $N_1 n/N$, however this may not be an integer.

The value of x which has maximum probability of occurring is the integral value of x satisfying the inequality

$$\frac{(N_1+1)(n+1)}{N_1+N_2+2} \geqq x \geqq \frac{(N_1+1)n-(N_2+1)}{N_1+N_2+2},$$

where it is understood that x is the number of elements in the sample of which there are N_1 in the population. In special cases both the lefthand and righthand values are integers. In such cases the two adjacent values of x have the same probability and there is no unique maximum.

Concerning the question about the probability on successive draws, we can make the following comment. If we have made j_1+j_2 draws of which j_1 gave names of white jurors and j_2 gave the names of Negro jurors, on the next draw the probability of getting a white juror is just the same as if we were drawing from a new box composed of N_1-j_1 white jurors and N_2-j_2 Negro jurors. Thus the probability of a white juror on the next draw is just

$$p=\frac{N_1-j_1}{N-j_1-j_2}.$$

This is the conditional probability, given the composition of the previous draws. If on the other hand we do not peek at the previous draws, then each draw has just probability N_1/N of being white, just as when we have a carefully shuffled pack of cards the answer to the question "What is the chance that the top card is the ace of hearts" is the same as the answer to the question "What is the chance that the fifth card is the ace of hearts", namely 1/52.

QUESTIONS and ANSWERS welcomes queries from any reader on any statistical problem. Questions should be sent to Frederick Mosteller, Harvard University, Emerson Hall, Cambridge 38, Massachusetts.

ON THE CLASSIFICATION OF STATISTICIANS CONTINUED FROM PAGE 17

mathematical design of a survey without some preliminary specifications of what is wanted. Finally, as a last step, an appraisal of the actual precision attained is made from a subsample of the data. This appraisal is independent of any assumptions, however crude or clever, that were made in the planning regarding the variances, co-variances, and proportions or any other parameters that enter the formulas for the standard errors of the results. This appraisal not only evaluates the precision of a past survey, but gives valuable information *for planning the next one.*

Before the theory of probability was used, the three problems listed above, *specification, design,* and *appraisal,* were independent. It was possible to specify what accuracy was desired, and it was possible to design surveys, or experiments, but the two were not linked up: one could only hope that his design would produce what was wanted, but he could never know. Moreover, no objective appraisal of precision was possible until probability theory was used in the planning as well as in the analysis, and little was learned from the experience of one study that could be helpful in the design of another. The only thing that could be done without probability theory was to compare the results of the survey with other surveys and census material. If they agreed, the survey was good; if they disagreed, there was no way of knowing whether the difficulty lay in the sample or in differences between questionnaires, training of interviewers, selection of respondents, or elsewhere.

The statistician is now able to plan most surveys and experiments so as to meet either a desired requirement of precision or a fixed budget or some reasonable compromise. Without statistical theory a survey or experiment may be expected to fail by committing one or the other of the two possible types of errors in design:

i. It may yield more precision than is needed, and thus be too costly, usually too slow, and excessively burdensome on the public.

ii. It may yield insufficient precision, in which case significant results fail of attainment, and the efforts and expense of the project are mostly lost.

The statistician thus effects economies in two ways: by spending no more than necessary on any one undertaking and by steering clear of losses in meaningless surveys. Without proper statistical planning and analysis through the use of the theory of probability there is no objective way of determining either in advance or afterward whether the survey fails in one way or the other: hence there is no objective way of deciding whether the survey is worth its cost. The statistician himself will, of course, occasionally fall into use of these two errors, but through his specialized knowledge he is in the best position to minimize, in the long run, the net economic losses resulting from both of these errors.

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The Employment Statistics Program of the Bureau of Labor Statistics

The findings of the ASA Advisory Committee

In May, 1945, the American Statistical Association was requested by the Secretary of Labor to appoint a committee "to review our projected employment statistics program and to give us the benefit of its comments and criticism". A committee was appointed, consisting of William A. Berridge, Metropolitan Life Insurance Company; Robert W. Burgess, Western Electric Company; Orin A. Fried, Labor Department, State of Wisconsin; Maurice I. Gershenson, Department of Industrial Relations, State of California; Samuel S. Wilks, (Chairman), Princeton University.

The Committee confined its study primarily to the general statistical aspects of the proposed expanded employment (non-agricultural) statistics program of the Bureau of Labor Statistics, with special reference to sampling procedures and benchmark problems. No attempt was made to carry out detailed examination and analysis of the actual statistical data gathered by BLS and used in making its employment estimates. It was considered that this would have been a duplication of effort, particularly since two members of the Committee, who direct state agencies which compile employment statistics in cooperation with BLS, have intimate knowledge of the data and procedures used by BLS in this field. Furthermore, the Committee did not concern itself any more than necessary with technicalities, concepts and definitions used in labor, employment and unemployment research. Excellent studies in this field were being conducted by the Palmer Committee on Labor Supply, Employment and Unemployment Statistics, and by the Labor Market Research Committee of the Social Science Research Council.

The conclusions of the Committee were briefly as follows:

One: The two approaches to the estimation of labor supply, employment, and unemployment, namely the household approach as used by the Monthly Report of the Labor Force, and the establishment approach as used by the Bureau of Labor Statistics are complementary. The establishment approach is the logical one for estimating employment within the various industries, while the household approach is the only effective method for obtaining estimates of characteristics both in and out of the labor force.

Two: The differences between the Bureau of Labor Statistics employment estimates and those of the Monthly Report of the Labor Force during 1942–1944 were large enough to warrant not only a study of factors contributing to them but also a careful definition of the meaning of estimates obtained by the two different methods, with particular reference to public releases of figures.

Three: It is highly desirable to establish a national system for obtaining employment statistics by industries (and by metropolitan areas) within states as well as national employment figures. Such state and area data would be much more useful to state and municipal governments and business and industrial groups than national figures.

Four: The Bureau of Labor Statistics plans for revising its reporting samples in accordance with modern sampling principles on the basis of state unemployment compensation lists so as to permit state figures for all industries covered by unemployment compensation is sound. Such a plan would constitute a major step toward the realization of a program of state employment statistics.

Five: The Bureau of Labor Statistics plan for establishing a national sample of small firms by the use of a block sample covering 460 cities is a sound sampling procedure for estimating employment in small firms for cities of more than 2500 population. It deserves a full test over a reasonable period of time if and when funds become available. If the test proves the method to be feasible and reliable it should be continued and eventually extended so as to include representation in smaller cities. If, however, this block-sampling plan should not turn out to be as effective as can reasonably be expected, it is the opinion of the Committee that the following possibilities should be carefully considered: (a) the use of a national area sample, if such a sample were established on an adequate scale by the Bureau of the Census; (b) sampling from unemploy-

ment compensation lists if and when mandatory unemployment compensation reporting within states is extended to all firms of one or more employees.

Six: Since the firms reporting employment in United States Employment Service form ES-270 are not selected as a scientific sample of firms, the employment data from ES-270 is not suitable as a source for employment statistics, particularly for small-firm industries.

Seven: The use of unemployment compensation lists within states for determining benchmarks for all industries which have a high percentage of employees covered by unemployment compensation is sound and should be continued as a permanent arrangement. Since there is always a likelihood of a progressively larger error for a link-relative system of estimation based on a benchmark as one progresses away from the benchmark, a benchmark should be constructed as often as possible—once a year if possible.

Eight: The Committee is of the opinion that benchmarks should henceforth be constructed from Bureau of Old Age and Survivors Insurance data or from a combination of unemployment compensation and Bureau of Old Age and Survivors Insurance data.

Nine: In order to avoid misleading and confusing discontinuities in state series of employment statistics, it is necessary for the Bureau of Labor Statistics and unemployment compensation agencies not only to use the same industrial classification system but also to work out plans for making changes in the industrial classification of firms, simultaneously, when the need arises.

The report was concluded with a set of eight recommendations concerned with sampling and benchmark procedures for both large-firm and small-firm industries, industrial classification, and strengthening the staff of technical personnel.

The Advisory Committee also recommended that the Bureau of Labor Statistics should have a continuing advisory committee on employment statistics meeting two or three times a year to discuss general plans and procedures for estimating non-agricultural employment. Such a committee should participate in the discussion of plans and procedures *before* they are put into operation. The committee should consist primarily of specialists in the field of employment statistics and experts in statistical methods, who are not employed by Federal government agencies.

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Range-Bar Charts

by KENNETH W. HAEMER

There are several members of the bar chart family that are extremely effective for specific purposes, yet are seldom used. Among these are simple range-bar charts and variations of this basic type. The range idea is not new: it is widely used in picturing time series data, especially in the form of the familiar high-low-closing stock price charts. However, for bar comparisons, that is for comparison of a number of items at a given time, it has been generally overlooked. The following examples show several different uses of the range-bar technique and suggest appropriate applications for each.

Chart 1 illustrates a simple range-bar comparison. These bars could represent any appropriate data measuring a spread of high and low values for a given period, such as rainfall, family income, or crop yield per acre. Since the bars are not aligned at the base, direct comparison of ranges is not provided: however, this method of construction does show the size and location of the range in relation to the total magnitudes, which is lost when the bars are aligned.

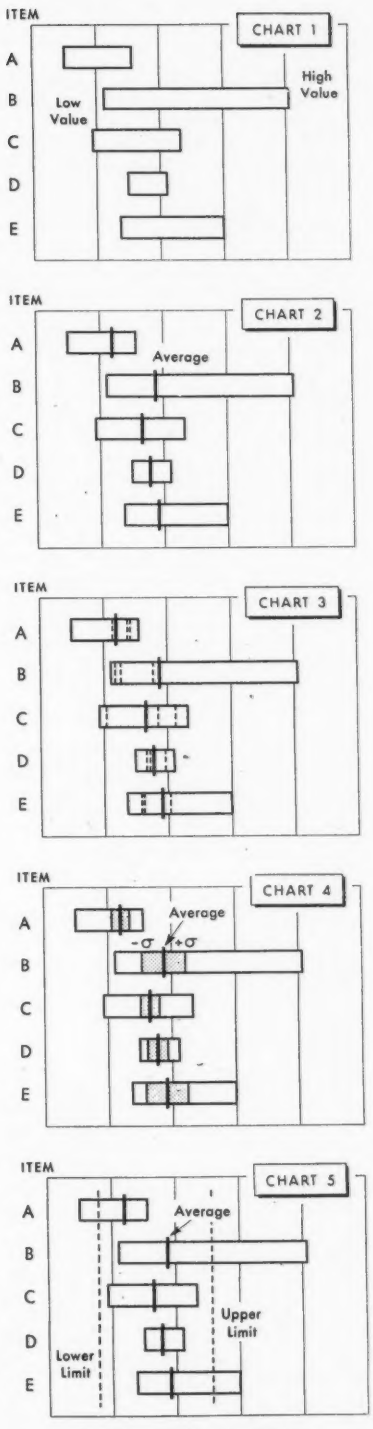
By adding a third value to each bar, as in Chart 2, this type becomes especially useful for showing an average and the range of values that is included in it. This picture not only shows the extreme values, but hints strongly at the general nature of the distribution. Such a chart is often much more informative than a conventional bar chart showing only the averages. It is equally useful for showing range in relation to other central measures such as the mode, median or geometric mean.

This technique can be carried a step further, plotting not only the extreme values included in the average but all the others in between as well. This addition is illustrated in Chart 3. When it works, this is a neat trick, but it is impractical if there are more than a few values to be shown for each item. This method also has the limitation that two or more identical values will fall on top of one another and therefore will appear as only one plotting. If there are very few values in the distribution, the average is often so unrepresentative that showing all values behind it becomes especially desirable.

A different development of Chart 2, suitable for showing the distribution of many values about an average, is shown in Chart 4. In this variation not only the average and the two extreme values are shown, but an additional range is inserted to mark the amount of one standard deviation plus and minus. This treatment shows the character of the distribution in capsule form and indicates the degree of dispersion about the average. In effect, each bar is a birds-eye view of a frequency distribution. This chart might be used for such purposes as comparing residential use of electric power in various cities, mileage of different brands or types of tire, or accident rates in different occupations or industries. Of course, a range of two standard deviations, plus and minus (or any other similar statistical measure), could be used just as effectively if appropriate.

Another logical offshoot from Chart 2 is illustrated by Chart 5. This type introduces the idea of a standard range or benchmark for judging performance. In this example the dashed lines represent the tolerance limits within which performance is acceptable, the bars represent the range of actual performance, and the solid cross-lines the average performance. A chart of this type is especially effective for showing quality control data, (in which case the bars would generally be much less "out of control" than in the illustration shown). However, it is equally useful for showing other less precise comparisons of results with range limits. For example, Chart 5 would be useful for showing such data as cash on hand compared with minimum and maximum requirements, warehouse space occupancy measured against high and low efficiency limits, or actual size of cut lumber compared with permissible tolerance limits.

Charts 2, 3, 4 and 5 show the result of following one line of development from the simple range-bar. Other equally useful varieties can be developed in other directions.



Typical examples of range bars

NEWS about MEMBERS

A **T. W. Anderson, Jr.**, assistant professor in the Department of Mathematical Statistics at Columbia University, was on leave the first half of the 1947–48 academic year at the Institute of Actuarial Mathematics and Mathematical Statistics, Stockholm University, as a Guggenheim Fellow. During the second half of the academic year he will be at Cambridge University. **Robert S. Aries** has been appointed director of the Northeastern Wood Utilization Council with offices in New York City. **Harry Alpert** has left the Division of Statistical Standards to become Chairman of the Department of Anthropology and Sociology at Queens College.

B **T. A. Bancroft**, formerly Associate Professor at the University of Georgia, Athens, Georgia, is now with the Statistical Laboratory, Alabama Polytechnic Institute, Auburn, Alabama. **Glenn H. Beyer**, for the past eleven years engaged in the housing work of the Federal Government, has been appointed Professor of Housing Research at Cornell. **Bonnar Brown**, formerly Assistant Director of the Division of Security Loans of the Board of Governors of the Federal Reserve System has been appointed Assistant Director in the Division of Research and Statistics. **M. A. Brumbaugh** has accepted a position with the Bristol Laboratories Inc., Syracuse, New York. **Raymond V. Bowers**, formerly Social Science Research Consultant, Office of Program Planning, Mental Hygiene Division, U. S. Public Health Service has been named Deputy Executive Director of the Committee on Human Resources. **M. Steffy Browne** is now Assistant Professor of Economics and Economic Geography at Brooklyn College, Brooklyn, New York.

C **Gabriel Cherin**, formerly with the Office of the Housing Expediter, has recently joined the staff of the Bureau of the Budget in Washington. **Henry P. Caulfield, Jr.**, is on leave from the Budget Bureau to attend the Graduate School of Public Administration at Harvard. **Dwight W. Chapman**, formerly consultant of the Clinical Psychology Section of the Veterans Administration, has been named Panel Director of the same committee. **William Leonard Crum** is now at the School of Business Administration, University of California.

F **Richard L. Funkhouser** has resigned as statistical consultant in the Office of the Administrator of the Civil Aeronautics Administration.

G **Eric F. Gardner** is now Assistant Professor of Statistics in the School of Education of Syracuse University. **James P. George** is now associate professor of Economic Statistics in the Department of Commerce and Business Administration, Arizona State College.

H **C. Morris Horowitz** is statistician with the American Association for Jewish Education. **J. McVicker Hunt**, formerly of Brown University, is Director of the Institute of Welfare Research in the Community Service Society of New York. **Duncan McC. Holthausen** is in charge of the Consumer Credit and Finances Section of the Division of Research of the Board of Governors of the Federal Reserve System. **Earl E. Houseman**, formerly statistical consultant in the Bureau of Agricultural Economics, has been named Statistical Assistant to the Chief of that Bureau. **Elvin A. Hoy**, formerly Chief of the Statistics Section, Division of Health and Disability Studies, Bureau of Research and Statistics, Social Security Administration, has transferred to the Navy Department as Chief, Research and Evaluation Section in the Standards and Research Division, Naval Reserve Training Publications Project.

J **Roberta Johns** has transferred from the Division of Statistical Standards, Bureau of the Budget, to the Department of Commerce to serve as Acting Chief, Technical Services Unit, Export Control Branch of the Office of International Trade.

K **Sidney Kaplan** has joined the Numerical Analysis Section of the Naval Ordnance Laboratory. **Francis J. Kennedy** is now at the College of Business Administration, Loyola University, New Orleans, La. **V. S. Kolesnikoff** of the Division of Statistical Standards is on part-time detail to the United Nations Statistical Office to undertake preparatory work on production classifications for the Committee on Statistical Classification of the UN Statistical Commission. **Irving Kravis** has resigned from the Bureau of Labor Statistics to accept an Associate Professorship in the Department of Economics, University of Massachusetts.

L **Edward H. Landreth** has completed his graduate work at the University of Minnesota and has accepted an instructorship in statistics at the University of Oklahoma. **Manfred Lilliefors** has been appointed Assistant Secretary of the Community Chest and Council of Bridgeport, Conn. **S. B. Littauer** is now Associate Professor of Industrial Engineering at Columbia University.

M **Clifford J. Maloney** has resigned as Research Associate at the Statistical Laboratory of Iowa State College to serve as Chief, Statistics Branch, Camp Detrick, Frederick, Maryland, an agency of the Chemical Corps of the U. S. Army. **Howard Mann** is now Chief Statistician and General Planning Officer of the Ninth Naval District at Headquarters, Great Lakes, Illinois. **Eli S. Marks**, formerly with the United States Public Health Service, is now in the Bureau of the Census. **Chandler Morse** has resigned from the Board of Governors of the Federal Reserve System to accept a teaching position at Williams College. **Frederick Mosteller** has been appointed Associate Professor of Mathematical Statistics in the Department of Social Relations of Harvard University.

P **Arthur G. Peterson**, National Military Establishment, is on a one-year assignment to the National Economic Board in Korea as economic adviser on food and agriculture.

Q **Maurice H. Quenouille**, formerly with the Rothamsted Experimental Station, Harpenden, Herts, England, has accepted the position of Lecturer in Statistics, Marischal College, University of Aberdeen, Scotland.

R **James A. Rafferty**, formerly of the Department of Pathology, University of Rochester, is now Chief of the Department of Statistics, Air University, School of Aviation Medicine, Randolph Field, Texas. **Philip M. Ritz**, formerly with the Sugar Rationing Administration, has recently joined the staff of the Bureau of the Budget. **Arthur Rosenhock**, formerly with the Maritime Commission, has joined the staff of the Bureau of the Census. **Donald C. Riley** of the Division of Statistical Standards, Bureau of the Budget, left on January 21 to advise the Puerto Rican government, at its request, on its basic statistical system. He returned the end of February. **Thomas C. M. Robinson** is on leave from the United States Department of Agricul-

ture. He is studying the needs of FAO member nations in the Near East.

S **G. W. Salisbury** is now with the Department of Dairy Husbandry at the University of Illinois, Urbana. **William H. Shaw,** formerly with the Office of Domestic Commerce, Department of Commerce, has transferred to the Office of Program Planning. **C. A. Sienkiewicz** is now President of the Central-Penn National Bank at Philadelphia, Pa. **Melvin W. Sneed,** formerly with the Veterans Administration, is now professional staff member of the U. S. Senate Committee for Labor and Public Welfare. **Charles D. Stewart** has replaced Edward D. Hollander as Chief of the Labor Economics Staff of the Bureau of Labor Statistics. **George J. Stigler,** formerly with Brown University, is now teaching in the Department of Economics, Columbia University, New York City. **Emil D. Schell,** formerly with the Employment Statistics Division, Bureau of Labor Statistics, has transferred to the Office of the Comptroller, U. S. Air Force, as Chief of the Mathematics and Electronic Computer Branch.

T **Amos E. Taylor** is on leave of absence from the Office of Business Economics, Department of Commerce, to assist the Pan American Union's newly created Department of Economic and Social Affairs in preparing for the 9th International Conference of American States, starting March 30, 1948, in Bogota, Colombia. **James Thompson** is Associate Professor of Psychology at Alabama Polytechnic Institute.

V **Patricia Van Deraa,** who was on three-months leave with Edward Falck and Company, has returned to the Budget Bureau. **Harry Venneman,** who was on six-months leave with the United Nations Statistical Office, has returned to the Budget Bureau.

W **John Edward Walsh** is working for Douglas Aircraft Company of Santa Monica, Calif. **Alfred N. Watson,** was recently appointed Assistant Treasurer of The Curtis Publishing Company. **Clarence M. Weiner** is on leave of absence for one year from the Veterans Administration to pursue graduate studies at the University of Wisconsin. **E. L. Welker** is Associate in Mathematics in the Bureau of Medical Economic Research of the American Medical Association. **Sol M. Wezelman** is Assistant Actuary in the North Dakota State Department of Insurance. **W. S. Woytinsky,** formerly with the Bureau of Employment Security, Social Security Administration, has joined the Twentieth Century Fund, as research director of the Survey on Employment and Wages in the United States. Jointly with Mrs. E. Woytinsky, formerly with the Department of State, he is also conducting a survey on economic and political trends in the postwar world, a three-year project of The Johns Hopkins University. **Robert M. Walsh,** formerly Special Assistant to the Chief of the Bureau of Agricultural Economics, has transferred to the Production and Marketing Administration. **Ralph J. Watkins** has been appointed coordinator of plans and programs for the National Security Resources Board.

Y **Ralph A. Young,** formerly an Assistant Director in the Division of Research and Statistics of the Federal Reserve Board, is now Associate Director of the Division.

CHAPTER NOTES

ALBANY

The subject of the meeting of January 21, 1948 was "Rising Wages or Excessive Profits—Which is Causing the Price Spiral?" The meeting was broadcast over Station WABY, constituting the Town Meeting of the Air program for that evening. The moderator was Dr. Charles F. Gosnell, State Librarian. The panel consisted of the following: David Prince, Vice-President of General Electric Company; Harold C. Hanover, Secretary, NYS Federation of Labor; William E. Zimmerman, NYS Department of Commerce; Miss Mildred M. Lauder, NYS Department of Labor.

CHICAGO

The Chicago Chapter held a joint meeting with the American Marketing Association on March 17 at which Dr. Charles O. Hardy discussed "Where Does Business Go from Here?"

At the Chicago Chapter's January meeting Dr. Ewan Clague, Commissioner of Labor Statistics, discussed "Productivity, Wages, and the American Standard of Living". Among other topics, Dr. Clague outlined the significance of the budget for a city worker's family which BLS recently developed for the Congressional Joint Committee on the Economic Report. At the February meeting, Dr. Dexter M. Keezer, Director of Economics for the McGraw-Hill Publishing Company, New York, spoke on "Measuring the Effects of the Taft-Hartley Law on Industrial Relations and Business Trends". At this meeting also, the "forecasts" for the fourth quarter of 1947 of several business measures made by chapter members were reviewed.

COLUMBUS

At the January meeting, John N. Hart, economist of the B. F. Goodrich Tire and Rubber Company of Akron, Ohio, spoke on European Recovery and American Aid: Comments on the Harriman Report. The speaker's discussion of the problems of American aid to Europe brought to the front the tentative success of the program as against the repercussions which might occur in either European or American economy.

At its February meeting, Dr. Donald R. G. Cowan of Cowan and Associates, Marketing Consultants, spoke on "Coal and Competition Fuels: An Analysis of Contrasting Economic Tendencies".

DENVER

The regular monthly dinner meeting for February heard Arno H. Johnson, Vice President and Director of Media and Research of J. Walter Thompson Company, speak on "Marketing Potentials of 1948". This was a joint meeting with the Advertising Club of Denver and invitation was also extended to members of the National Association of Cost Accountants. At the March meeting, Guy W. Thomas, Manager, Power Department, Public Service Company of Colorado, discussed "Power Problems in This Region". He appraised the power market, discussed the present shortage, and indicated potential plans for coping with this problem.

ITHACA

At the first meeting of the recently organized Ithaca Chapter, Dr. E. E. Day, President of Cornell and Past President of the American Statistical Association, presided. Dr. Day's introductory remarks covered his early experiences in the field and traced the remarkable growth and development of statistics in a very entertaining manner.

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Dr. William Feller, President of the Institute of Mathematical Statistics and Dr. W. F. Willcox, Honorary President of the International Institute of Statistics, each gave interesting talks on the relationships and developments within the organizations they represented.

Dr. A. F. Hinrichs, former Commissioner of the Bureau of Labor Statistics, talked briefly on some of his experiences in the interpretation and validity of data.

NEW YORK

The Statistical Techniques Division and the Metropolitan New York Section of the American Society for Quality Control held a joint meeting on March 17 at which Dr. Paul S. Olmstead of the Bell Telephone Laboratories spoke on "Sampling in Industrial Work".

A March meeting was conducted by the Social Statistics Division on the topic "Mobility of Population and Business in the New York Metropolitan Region". The chairman was Dr. Donald Young, Executive Director, Social Science Research Council, and the speakers and their subjects were: "Changes in the Population Distribution of This Region", Frederick P. Clark, Planning Director, Regional Plan Association, Inc.; "Daily Mobility of Population Within This Area", Nathan Cherniack, Economist, The Port of New York Authority; "Mobility of Industry and Business in This Region", Dr. Meredith B. Givens, Director of Research and Statistics—Div. of Placement and Unemployment Insurance, New York State Department of Labor; "Plans of the U. S. Census for Improving Data on Mobility", Dr. Henry S. Shryock, Jr., Population Division, U. S. Bureau of the Census.

OKLAHOMA CITY

At the March 3 meeting of the Oklahoma City Chapter, K. D. Blood reported on the interest shown by members in having a special Statistical Seminar. W. J. Barr, Actuary of the Home State Life Insurance Company, discussed life insurance procedure and problems. He gave detailed consideration to premium rates, mortality tables and types of insurance.

PHILADELPHIA

At its March dinner meeting, James F. Hughes, member of the firm of Auchincloss, Parker and Redpath, spoke on the "New Stock Market". Mr. Hughes was selected to address this meeting as a person who, in the opinion of the Chapter, was the best speaker to appear before the annual meeting of the Association.

SACRAMENTO

The American Statistical Association announces with great pleasure the chartering of the Sacramento Statistical Association as a Chapter. The President of the Sacramento group is Sheldon T. Russell and the petition was signed by 15 ASA members who have long been active in Sacramento.

WASHINGTON

The Washington Chapter held a meeting on March 3 on "Will There Be a Recession in 1948?" Speakers were: Everett E. Hagen, Acting Director, Office of Program Planning; V. Lewis Bassie, Fiscal Analyst, Fiscal Analysis Branch, Department of Commerce; Robert R. Nathan, Robert R. Nathan Associates, Inc.

New Officers and Committees for 1948 were reported by the various chapters as follows:

COLUMBUS

Officers

President—Alva F. Tuttle, The Ohio State University; First Vice President—Virgil H. Dassel, Citizens Research, Inc. and Capital University; Second Vice President—Rosemary Tague, The Columbus Chamber of Commerce; Secretary-Treasurer—Mikhail V. Condoide, The Ohio State University.

Committees

Program Committee: Chairman—John W. Maine, Dept. of Public Welfare, State of Ohio; Ira M. Korst, The Ohio Chamber of Commerce; John R. Ervin, The Ohio State University.

Membership Committee: Chairman—L. E. Smart, The Ohio State University; Wharton F. Keppler, Moores & Ross Dietetic Laboratories, Inc.; Harold J. Mills, The Ohio Chamber of Commerce; John C. Waidner, Dept. of Public Welfare, State of Ohio.

CONNECTICUT

Officers

President—Herbert E. Arnold, Associate Professor of Mathematics, Wesleyan University; Vice President—Louis M. Nichols, Comptroller, General Electric Supply Corporation; Secretary-Treasurer—John H. Watkins, Associate Professor of Public Health, Yale University.

Members of the Executive Council:

Samuel Simonovitz, State Development Commission; David F. Votow, Department of Mathematics, Yale University.

HARRISBURG

Officers

President—Harry Hoyle, Pa. Bureau of Employment and Unemployment Compensation; Vice President—James D. Wygant, Pa. Bureau of Employment and Unemployment Compensation; Corresponding Secretary—W. E. Allebach, Pa. Dept. of Public Assistance; Treasurer—E. C. Heidelbaugh, Bell Telephone Co.

OKLAHOMA CITY

Officers

Chartered 1947. President—Francis R. Cella, Bureau of Business Research, University of Oklahoma; 1st Vice-President—J. Wilbur Magann, Oklahoma Gas and Electric Company; 2nd Vice-President—Mrs. Margaret Shackelford, Oklahoma State Department of Health; Secretary-Treasurer—Robert S. McCauley, Bureau of Agricultural Economics, Oklahoma City.

SAN FRANCISCO

Officers

President—Emily Huntington, Dept. of Economics, University of California; Vice President—William A. Spurr, Graduate School of Business, Stanford University, California; Secretary-Treasurer—Kenneth C. Christensen (re-elected), Pacific Gas and Electric Company.

UNIVERSITY OF ILLINOIS

Officers

President—H. W. Bean, College of Agriculture; Vice President—F. G. Cornell, Mathematics; Secretary-Treasurer—D. W. Paden, College of Commerce.